

## PROBLEM SET 4. DUE MONDAY 11 SEPTEMBER

### PROBLEM SET 3. PROBLEMS FROM LECTURE 3.

**Reading.** *Quick Calculus*, pp. 129–137; 143–150.

**Supplementary reading.** Simmons, Sections 4.1–4.4..

1. (10pts) This is a review of some of the differentiation rules from lecture on Wednesday. Differentiate the following functions.
  - (a)  $y = [\cos(x) \sin(x)]^5$
  - (b)  $y = \log_5[(2x^2 - 6) \cdot (x + 7)]$
  - (c)  $y = \ln[\cos(4x^2)]$
  - (d)  $y = e^{\tan(x)}$
  - (e)  $y = \sin(\frac{1}{x})$
2. (6pts) Use the first and second derivatives to graph the following functions.
  - (a)  $y = x^3 + x^2 + 5x + 4$
  - (b)  $y = e^{x^2}$
  - (c)  $y = \frac{x-3}{x^3-3x^2-9x+27}$
3. (2pts) A university bookstore can get the book *The Beer-Lover's Guide to Boston* at a cost of \$6 per copy from the publisher. The bookstore manager estimates that she can sell 180 copies at a price of \$16, and that each \$1 reduction in price will increase sales by 30 copies. What should the price of the book be in order to maximize the bookstore's total profits on the book?
4. (2pts) You need to make a box (with no lid) out of a piece of cardboard that is 10cm by 20cm. What is the maximum volume of the box?